

**BEFORE THE
PUBLIC SERVICE COMMISSION OF
SOUTH CAROLINA**

DOCKET NO. 2020-1-E

In the Matter of)	DIRECT TESTIMONY
Annual Review of Base Rates)	OF JULIE K. TURNER FOR
for Fuel Costs for)	DUKE ENERGY PROGRESS, LLC
Duke Energy Progress, LLC)	

1 **Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

2 A. My name is Julie K. Turner and my business address is 411 Fayetteville Street, Raleigh, North
3 Carolina.

4 **Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

5 A. I am Vice President of Carolinas Coal Generation for Duke Energy Carolinas, LLC ("DEC")
6 and Duke Energy Progress, LLC ("DEP" or the "Company").

7 **Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL**
8 **BACKGROUND.**

9 A. I graduated from North Carolina State University with a Bachelor of Science degree in
10 Mechanical Engineering and received a Master's degree in Business Administration from the
11 University of Colorado. My career began with Duke Energy (d/b/a Carolina Power & Light)
12 in 1991 as a staff engineer at DEP's Harris Nuclear Station. Since that time, I have held
13 various roles of increasing responsibility in the generation engineering, maintenance, and
14 operations areas, including the role of Station Manager, first at DEP's Lee Energy Complex,
15 followed by leading six DEP natural gas generating stations. I was named Vice President of
16 Carolina Natural Gas Generation in 2016. I assumed my current role in April 2020.

17 **Q. WHAT ARE YOUR DUTIES AS VICE PRESIDENT OF CAROLINAS COAL**
18 **GENERATION?**

19 A. In this role, I am responsible for providing event free and reliable operations of the coal
20 generation fleet, which includes six coal stations, serving North Carolina and South Carolina
21 by providing approximately 10,000 megawatts ("MWs") of generation capacity. My
22 responsibilities include operating and maintaining the fleet within design parameters and
23 implementing safe work practices and procedures to ensure the safety of our employees.

Q. HAVE YOU TESTIFIED BEFORE THIS COMMISSION IN ANY PRIOR PROCEEDINGS?

A. Yes, I testified in DEP's base rate proceeding in Docket No. 2018-318-E and 2019 fuel proceeding in Docket No. 2019-1-E.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to (1) describe DEP's Fossil/Hydro/Solar generation portfolio and changes made since the 2019 fuel cost recovery proceeding, as well as those expected in the near term, (2) discuss the performance of DEP's Fossil/Hydro/Solar facilities during the period of March 1, 2019 through February 29, 2020 (the "review period"), (3) provide information on significant Fossil/Hydro/Solar outages that occurred during the review period, and (4) provide information concerning environmental compliance efforts.

Q. PLEASE DESCRIBE DEP'S FOSSIL/HYDRO/SOLAR GENERATION PORTFOLIO FOR THE REVIEW PERIOD.

A. The Company's Fossil/Hydro/Solar generation portfolio consists of 9,228 MWs of generating capacity, made up as follows:

Coal-fired -	3,166 MWs
Combustion Turbines -	2,816 MWs
Combined Cycle Turbines -	2,970 MWs
Hydro -	227 MWs
Solar -	49 MWs ¹

¹ This value represents the relative dependable capacity contribution to meeting summer peak demand, based on the Company's integrated resource planning metrics. The nameplate capacity of the Company's solar facilities is 141 MWs.

1 The 3,166 MWs of coal-fired generation represent two generating stations and a total
2 of five units. These units are equipped with emission control equipment, including selective
3 catalytic reduction (“SCR”) equipment for removing nitrogen oxides (“NO_x”), flue gas
4 desulfurization (“FGD” or “scrubber”) equipment for removing sulfur dioxide (“SO₂”), and
5 low NO_x burners. This inventory of coal-fired assets with emission control equipment
6 enhances DEP’s ability to maintain current environmental compliance and concurrently
7 utilize coal with increased sulfur content – providing flexibility for DEP to procure the most
8 cost-effective options for fuel supply.

9 The Company has a total of 32 simple cycle combustion turbine (“CT”) units, the
10 larger 14 of which provide 2,183 MWs, or 78% of CT capacity. These 14 units are located at
11 the Asheville, Darlington, Richmond County, and Wayne County facilities, and are equipped
12 with water injection and/or low NO_x burners for NO_x control. The 2,970 MWs shown as
13 “Combined Cycle Turbines” (“CC”) represent five power blocks. The Asheville Combined
14 Cycle (“Asheville CC”) power block has a configuration of one CT and one steam turbine.
15 The CT of the second Asheville CC power block came on-line in January 2020, and the steam
16 turbine component came on-line in April 2020. The H.F. Lee Energy Complex CC power
17 block (“Lee CC”) has a configuration of three CTs and one steam turbine. The two Richmond
18 County power blocks located at the Smith Energy Complex consist of two CTs and one steam
19 turbine each. The Sutton Combined Cycle at Sutton Energy Complex (“Sutton CC”) consists
20 of two CTs and one steam turbine. The five CC power blocks are equipped with SCR
21 equipment, and all nine CTs have low NO_x burners. The steam turbines do not combust fuel
22 and, therefore, do not require NO_x controls. The Company’s hydro fleet consists of 15 units

1 providing 227 MWs of capacity. The Company's solar fleet consists of four sites providing
2 49 MWs of dependable capacity.

3 **Q. WHAT NOTABLE CHANGES HAVE OCCURRED WITHIN THE**
4 **FOSSIL/HYDRO/SOLAR PORTFOLIO SINCE DEP'S 2019 ANNUAL FUEL**
5 **PROCEEDING?**

6 A. Asheville CC commissioned its first power block in December 2019, which increased its
7 capacity by 237 MWs. The CT of the second Asheville CC power block came on-line in
8 January 2020, which increased capacity by 153 MW. The steam turbine component of the
9 second Asheville CC power block came on-line in April 2020. The total Asheville CC
10 capacity is 474 MWs. The Asheville Units #1 and #2 coal-fired generation retired in January
11 2020, which reduced capacity by 378 MWs.

12 **Q. WHAT ARE DEP'S OBJECTIVES IN THE OPERATION OF ITS**
13 **FOSSIL/HYDRO/SOLAR FACILITIES?**

14 A. The primary objective of DEP's Fossil/Hydro/Solar generation department is to provide safe,
15 reliable and cost-effective electricity to DEP's customers. Operations personnel and other
16 station employees are well-trained and execute their responsibilities to the highest standards
17 in accordance with procedures, guidelines, and a standard operating model. Like safety,
18 environmental compliance is a "first principle," and DEP works very hard to achieve high
19 level results.

20 The Company achieves compliance with all applicable environmental regulations and
21 maintains station equipment and systems in a cost-effective manner to ensure reliability. The
22 Company also takes action in a timely manner to implement work plans and projects that
23 enhance the safety and performance of systems, equipment, and personnel, consistent with

1 providing low-cost power options for DEP's customers. Equipment inspection and
2 maintenance outages are generally scheduled during the spring and fall months when
3 customer demand is reduced due to milder temperatures. These outages are well-planned and
4 executed with the primary purpose of preparing the unit for reliable operation until the next
5 planned outage.

6 **Q. HOW MUCH GENERATION DID EACH TYPE OF GENERATING FACILITY**
7 **PROVIDE FOR THE REVIEW PERIOD?**

8 A. For the review period, DEP's total system generation was 60,425,926 megawatt-hours
9 ("MWHs"), of which 31,592,283 MWHs, or approximately 52%, was provided by the
10 Fossil/Hydro/Solar fleet. The breakdown includes a 36% contribution from gas facilities,
11 15% contribution from coal-fired stations, 1.1% contribution from hydro facilities, and 0.4%
12 from solar facilities.

13 The Company's portfolio includes a diverse mix of units that, along with its nuclear
14 capacity, allows DEP to meet the dynamics of customer load requirements in a logical and
15 cost-effective manner. Additionally, DEP has utilized the Joint Dispatch Agreement with
16 DEC, which allows generating resources for DEP and DEC to be dispatched as a single system
17 to enhance dispatching at the lowest possible cost. The cost and operational characteristics of
18 each unit generally determine the type of customer load situation (e.g., base and peak load
19 requirements) that a unit would be called upon or dispatched to support.

20 **Q. HOW DID DEP COST EFFECTIVELY DISPATCH THE DIVERSE MIX OF**
21 **GENERATING UNITS DURING THE REVIEW PERIOD?**

22 A. The Company, like other utilities across the U.S., has experienced a change in the dispatch
23 order for each type of generating facility due to continued favorable economics resulting from

1 the lower pricing of natural gas. Further, the addition of new CC units within DEP's portfolio
2 in recent years has provided DEP with additional natural gas resources that feature state-of-
3 the-art technology for increased efficiency and significantly reduced emissions. These factors
4 promote the use of natural gas and provide real benefits in cost of fuel and reduced emissions
5 for customers. Gas-fired facilities provided 69% of the DEP Fossil/Hydro/Solar generation
6 during the review period.

7 **Q. WHAT WAS THE HEAT RATE FOR DEP'S COAL-FIRED AND COMBINED**
8 **CYCLE UNITS DURING THE REVIEW PERIOD?**

9 A. Heat rate is a measure of the amount of thermal energy needed to generate a given amount of
10 electric energy and is expressed as British thermal units ("Btu") per kilowatt-hour ("kWh").
11 A low heat rate indicates an efficient fleet that uses less heat energy from fuel to generate
12 electrical energy. Over the review period, the Company's seven coal units produced 28% of
13 the Fossil/Hydro/Solar generation, with the average heat rate for the coal-fired units being
14 10,876 Btu/kWh. The most active station during this period was Roxboro, providing 75% of
15 the coal production for the fleet with a heat rate of 10,524 Btu/kWh. During the review period,
16 the Company's five combined cycle power blocks produced 62% of the Fossil/Hydro/Solar
17 generation, with an average heat rate of 7,238 Btu/kWh.

18 **Q. PLEASE DISCUSS THE OPERATIONAL RESULTS FOR DEP'S**
19 **FOSSIL/HYDRO/SOLAR FLEET DURING THE REVIEW PERIOD.**

20 A. The Company's generating units operated efficiently and reliably during the review period.
21 Several key measures are used to evaluate the operational performance depending on the
22 generator type: (1) equivalent availability factor ("EAF"), which refers to the percent of a
23 given time period a facility was available to operate at full power, if needed (EAF is not

1 affected by the manner in which the unit is dispatched or by the system demands; it is
2 impacted, however, by planned and unplanned maintenance (*i.e.*, forced) outage time); (2)
3 net capacity factor (“NCF”), which measures the generation that a facility actually produces
4 against the amount of generation that theoretically could be produced in a given time period,
5 based upon its maximum dependable capacity (NCF *is* affected by the dispatch of the unit to
6 serve customer needs); (3) equivalent forced outage rate (“EFOR”), which represents the
7 percentage of unit failure (unplanned outage hours and equivalent unplanned derated hours);
8 a low EFOR represents fewer unplanned outage and derated hours, which equates to a higher
9 reliability measure; and, (4) starting reliability (“SR”), which represents the percentage of
10 successful starts.

11 The following chart provides operational results categorized by generator type, as well
12 as results from the most recently published North American Electric Reliability Council
13 (“NERC”) Generating Unit Statistical Brochure (“NERC Brochure”) representing the period
14 2014 through 2018. The NERC data reported for the coal-fired units represents an average of
15 comparable units based on capacity rating.

Generator Type	Measure	Review Period	2014-2018	Nbr of Units
		DEP Operational Results	NERC Average	
Coal-Fired Test Period	EMF	79.5%	80.7%	399
	NCF	28.2%	56.3%	
	EFOR	5.4%	8.2%	
Coal-Fired Summer Peak	EMF	91.8%	n/a	n/a
Total CC Average	EMF	82.1%	84.9%	333
	NCF	67.3%	53.6%	
	EFOR	0.77%	5.1%	
Total CT Average	EMF	82.4%	87.5%	750
	SR	98.4%	98.3%	
Hydro	EMF	64.7%	80.2%	1,063

Q. PLEASE DISCUSS SIGNIFICANT OUTAGES OCCURRING AT DEP'S FOSSIL/HYDRO/SOLAR FACILITIES DURING THE REVIEW PERIOD.

A. In general, planned maintenance outages for all fossil and hydro units are scheduled for the spring and fall to maximize unit availability during periods of peak demand. Most units had at least one short planned outage during this review period to inspect and maintain plant equipment. Due to COVID-19, DEP's Fossil/Hydro/Solar fleet is currently completing only essential reliability outage work, and most planned outages have moved to the summer and fall.

Roxboro Unit 3 had a planned outage in Spring 2019. The primary purpose of the outage was to perform a boiler inspection. Roxboro Unit 1 had a planned outage in Fall 2019. The outage scope included air heater basket and gearbox replacements, FGD inspections and repairs, high energy piping inspections, and replacement of the vibration sensing equipment to the turbine.

The CC fleet performed planned outages at Richmond County CC PB5 and Lee CC in Spring 2019. The primary purposes of the Richmond CC PB5 outage were to perform a major hot gas path inspection, conduct a steam turbine overhaul, generator rewind, high energy piping inspection, and heat recovery steam generator ("HRSG") inspection. The

1 primary purposes of the Lee CC's full block maintenance were HRSG inspection, clean
2 SCRs/condenser, and install new distributive control system upgrade.

3 The CT fleet performed planned outages in the Spring and Fall of 2019. In Spring
4 2019, Darlington CT Unit 13 outage was performed a hot gas path inspection and boroscope
5 inspection. In the Fall of 2019, Asheville CT Unit 4's planned outage was to upgrade the
6 distributive control systems. Also in the Fall of 2019, Richmond County Unit 6 CT performed
7 an outage to complete GT rotor replacement and generator rewind.

8 **Q. HOW DOES DEP ENSURE EMISSIONS REDUCTIONS FOR ENVIRONMENTAL**
9 **COMPLIANCE?**

10 A. The Company has installed pollution control equipment on coal-fired units, as well as new
11 generation resources, in order to meet various current federal, state, and local reduction
12 requirements for NO_x and SO₂ emissions. The SCR technology that DEP currently operates
13 on the coal-fired units uses ammonia or urea for NO_x removal and the scrubber technology
14 employed uses crushed limestone or lime for SO₂ removal. SCR equipment is also an integral
15 part of the design of the newer CC facilities in which aqueous ammonia (19% solution of
16 NH₃) is introduced for NO_x removal.

17 Overall, the type and quantity of chemicals used to reduce emissions at the plants
18 varies depending on the generation output of the unit, the chemical constituents in the fuel
19 burned, and/or the level of emissions reduction required. The Company is managing the
20 impacts, favorable or unfavorable, as a result of changes to the fuel mix and/or changes in
21 coal burn and utilization of non-traditional coals. Overall, the goal is to effectively comply
22 with emissions regulations and provide the optimal total-cost solution for operation of the
23 unit. The Company will continue to leverage new technologies and chemicals to meet both

1 present and future state and federal emissions requirements including the Mercury and Air
2 Toxics Standards (“MATS”) rule. MATS chemicals that DEP may use in the future to reduce
3 emissions include, but may not be limited to, activated carbon, mercury oxidation chemicals,
4 and mercury re-emission prevention chemicals. Company witness Harrington provides the
5 cost information for DEP’s chemical use and forecast.

6 **Q. DOES THAT CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?**

7 A. Yes, it does.